MODULATION OF DYNAMICAL SYSTEMS FOR COMMUNICATION

PRIORITY INFORMATION

This application claims priority from provisional application Ser. No. 60/269,052 filed February 15, 2001. This invention was made with government support under Grant No. F49620-96-1-0072 awarded by the United States Air Force and Cooperative Agreement No. DAAL01-96-2-0001 awarded by the United States Army. The government has certain rights in the invention

BACKGROUND OF THE INVENTION

Many approaches have been taken to embed continuous-time information bearing waveforms onto continuous-time carrier waveforms for the purpose of communication. Amplitude modulation (AM) and frequency modulation (FM) are common examples of such approaches to communication. In both AM and FM, the carrier wave is a sinusoidal wave. There is a need in the art for a systematic procedure for constructing continuous-time modulators and their corresponding demodulators using carrier waves that are generated by nonlinear systems that have periodic, almost-periodic, quasi-periodic or chaotic attractors.

SUMMARY OF THE INVENTION

Accordingly, the invention provides a new class of signal modulators and their corresponding demodulators. The modulator embeds into a carrier signal an information signal by modulating the oscillatory rate of the carrier signal in a manner proportional to the information signal. The permissible carrier signals are any signals that can be generated by a nonlinear dynamical system that has a known exponentially convergent observer.